AMENDMENTS TO THE SPECIFICATION

Marked-Up Paragraphs:

[0024] The applicants further recognized that the local inlet flow properties for a fundamental body may be considered to be a function of a single parameter. The single parameter may be taken to be the inlet flow velocity, the inlet flow height, the inlet Froude number, the inlet width, or any function of those four. When the single parameter is determined, the remaining inlet flow properties may be calculated. In some embodiments of the invention, the inlet flow velocity is selected as the single unknown or free parameter. Assumptions which allow all inlet properties to be determined from the inlet flow velocity are explained in greater detail in ~~co-pending~~ U.S. ~~Provisional~~ Patent ~~Application~~ No. ~~60/466,655~~6,885,941, but are summarized here: (a) that the size distribution of grains in the flow is known, (b) that the total volume of suspended sediment at the inlet is the maximum carrying capacity of the flow, so that the deposition rate is substantially zero at the inlet but becomes non-zero with an infinitesimal decrease in flow velocity, and (c) that empirical relations giving flow height and width as a function of flow velocity for flows in channels apply at the inlet location.

[0031] In ~~co-pending~~ U.S. ~~Provisional~~ Patent ~~Application~~ No. ~~60/466,655~~6,885,941, assumptions are made about relationships between inlet flow properties. In one embodiment, flow velocity becomes the only independent variable in defining the local inlet properties. Thus, in that embodiment, characterizing the local inlet properties throughout the composite body can be accomplished by simply characterizing the local inlet flow velocities throughout the composite body. Typically, the inlet flow velocity trend would be one of exponential decay in local inlet velocity with interpreted downstream distance from the composite body inlet and the probability distribution would be assumed to be log-normal around the peak likelihood specified by the trend. This trend and probability distribution in local inlet velocity is then fully described by three parameters: the most likely local inlet velocity at a point, the characteristic length of the exponential decay in most likely local inlet velocity, and the standard deviation (on a logarithmic scale) of the log-normal distribution of local inlet velocities around the most likely value. Methods for fitting this three-parameter model to a set of point determinations of local inlet velocity are familiar to persons of ordinary skill in the art. One such method is to fit a straight line to the plot of the natural logarithm of velocity versus distance from the composite body inlet. Once the line is fit, the three model parameters can be determined as follows: the required velocity at a point can be the velocity at any point on the line, the characteristic length of the exponential decay is the negative inverse of the slope of the line, and the standard deviation of the logarithm of velocity is the standard deviation of the measured points around the line.

AMENDMENTS TO THE SPECIFICATION *(Cont.)*

[0032] The estimation of parameters of a model describing the variation of inlet properties within the system requires actual estimates of inlet properties in at least one location within the system. Persons of ordinary skill the in art, with the benefit of the disclosures in ~~co-pending~~ U.S. ~~Provisional~~ Patent ~~Applications 60/466,655~~No. 6,885,941, and PCT Patent Publication Nos. ~~60/459,144~~WO2004/093521 and ~~60/454,516~~WO2004/083896 will recognize a variety of methods that could be used to provide inlet properties for particular sand bodies identified in seismic data or by well penetrations. These methods are intended to be within the scope of this invention.

[0034] Once the inlet flow properties for the new fundamental body have been established, the fundamental body properties are determined. Typically, the fundamental bodies are calculated by numerical simulation of the fluid flow which deposits them, using the local inlet properties as boundary conditions. A first embodiment for making this numerical simulation is described in co-pending ~~U.S. Provisional Patent Application number 60/558,287~~PCT Patent Publication No. WO2005/104003, where time-varying vertically-averaged equations for conservation of flow momentum, flow volume, and sediment volume are solved numerically to determine the evolution of the deposit and its internal grain size distribution through time. The simulation progresses until the body becomes large enough to substantially divert the flow that forms it. A second embodiment for making the numerical simulation is described in ~~co-pending~~ U.S. Patent ~~Application number 10/829,600~~No. 6,885,941, and is generally preferred over the first embodiment because it is computationally faster, though less accurate. In this second embodiment, vertically averaged equations are also used, but to calculate a steady-state flow from the inlet flow properties, assuming flat topography below the flow. This flow has an associated deposition rate at each mapview location and is assumed to persist in steady state until the body has built to a specified maximum height which is also a function of the inlet flow properties. Persons of ordinary skill in the art will recognize other methods for calculating properties of a fundamental body once the inlet flow properties are determined, including other numerical simulation techniques. These methods are within the scope of this invention.

[0041] Next, the flow field associated with the fundamental body is used to determine the extent to which underlying sediment is removed by erosional scour. A variety of empirical relationships between flow properties and erosion have been published and are all within the scope of this invention. The preferred embodiment is the erosion treatment in ~~co-pending U.S. Provisional Patent Application 60/558,287~~ PCT Patent Publication No. WO2005/104003. The appropriate net erosion rate may be calculated at each point below the flow field, and sediment removed from the composite body model at each point to a depth equal to the erosion rate ~~multipled~~ multiplied by the flow duration.

[0048] **Step 502**: Identify at least part of the mapview outline of at least one fundamental body within the composite body. This identification is typically made in the same three-dimensional seismic volume used to identify the composite body outline. The method of picking these smaller units is typically based on contours of seismic amplitude, but persons of ordinary skill in the art will recognize other methods for picking stratigraphic units near the resolution limits of seismic data. Automated tools have been described to assist in this process, for example, in ~~co-pending~~ U.S. Patent ~~Application~~ No. ~~10/395,911~~6,674,689. Interpreted lines of three-dimensional seismic data, other remote imaging techniques, correlating well logs, and spatially correlated outcrop observations could also be used to identify outlines of fundamental bodies within the composite body. These other methods are also within the scope of this invention.

[0049] **Step 503:** Determine the properties for the observed fundamental bodies. One method is specified in ~~co-pending~~ U.S. ~~Provisional~~ Patent ~~Application no. 60/466,655~~No. 6,885,941. In this method, the seismic interpreter provides general paleocurrent directions sufficient to identify a local inlet point and down-stream end point for each identified seismic body. The method then utilizes constraints from fluid mechanics to relate a mapview contour of constant deposit thickness to the inlet properties of the flow that built the deposit.

[0057] **Step 603:** Determine the properties of the sampled fundamental bodies. In one embodiment this involves determining the local inlet conditions associated with the sampled fundamental bodies. One method for making this determination is described in ~~co-pending U.S. provisional patent application no. 60/459,144~~PCT Patent Publication No. WO2004/093521, wherein the method involves (a) estimating flow properties at the location where the well penetrates each body, (b) extrapolating these flow properties back to the inlet location (identified as the point where the flow properties become consistent with flow in a channel), and (c) adjusting the initial flow property estimate until the extrapolated inlet flow properties are consistent with the extrapolated maximum height of the body. Applying this method to sand bodies that the well penetrates within the system gives inlet properties for these bodies.

[0059] Local inlet properties were calculated in step **603** for bodies in the vicinity of the well. If only one well is available, then it may not provide information about the trend of those properties throughout the system. One method for determining the trend in inlet properties throughout the system uses the relationship between system thickness and vertically averaged grain size distribution, as described in ~~co-pending U.S. Provisional Patent Application No. 60/454,516~~PCT Patent Publication No. WO2004/083896. The vertically averaged grain size distribution at a point in the system will be approximately equal to the average thickness-weighted grain size distribution in the typical sand body at that location. To determine the inlet properties of the typical sand body at a given location, the following method may be used: (a) determine the vertically averaged grain size distribution at that location from the composite body thickness at that location. This determination can be made using the thickness and vertically averaged grain size at a different location where core is available together with the method of ~~co-pending U.S. Provisional Patent Application No. 60/454,516~~PCT Patent Publication No. WO2004/083896; (b) estimate the typical inlet velocity at that location; (c) calculate the other inlet properties based on the inlet velocity estimate; (d) simulate the sand body form and grain size distribution associated with the estimated inlet velocity; (e) calculate the average thickness-weighted grain size distribution within the simulated sand body; (f) refine the inlet velocity estimate in step (b) until the average thickness-weighted grain size distribution within the body is substantially equal to the vertically averaged grain size distribution at that location as predicted in step (a). This method provides the inlet property trends directly from the shape of the composite body, without the need for observations of fundamental bodies at a second mapview location.